

# NASA TECH BRIEF

## *Goddard Space Flight Center*



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### **General Optics Evaluation Program [GENOPTICS]**

#### **The problem:**

Optical systems that use many mirrors, lenses, diffraction gratings, or other surfaces are too complex to be analyzed or synthesized by methods that treat each component individually.

#### **The solution:**

A computer program has been developed to conduct operations on the many varied components of an optical system and to print and plot the results of computations such as ray traces, radial energy distributions, and designs of two-mirror telescopes.

#### **How it's done:**

A programed geometry has been devised to allow the description of planar, conic, toric, cylindrical, and polynomial surfaces. The surfaces may appear in a variety of orientations. The path of a ray through the system is determined by an iterative technique. The modulation transfer function for the system can be computed, and third order aberration coefficients including aspheric contributions are considered. Designs of Ritchey-Chretien, Cassegrain, and Dahl-Kirkham telescopes are obtained via third-order

theory. Different colors of light can be used. The interface with a Calcomp plotter is then invoked to make a sketch of results of the synthesis or analysis.

#### **Notes:**

1. This program may be used for any optical system with a design or operation that requires ray tracing with aberrations over a variety of surfaces.
2. The program was written for a CDC 3200 computer under the Real Time Scope executive using FORTRAN IV language. Conversion to another version of FORTRAN could be accomplished with minor alterations.
3. Inquiries concerning this program should be directed to:

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Reference: GSC-12038 (GENOPTICS)

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